



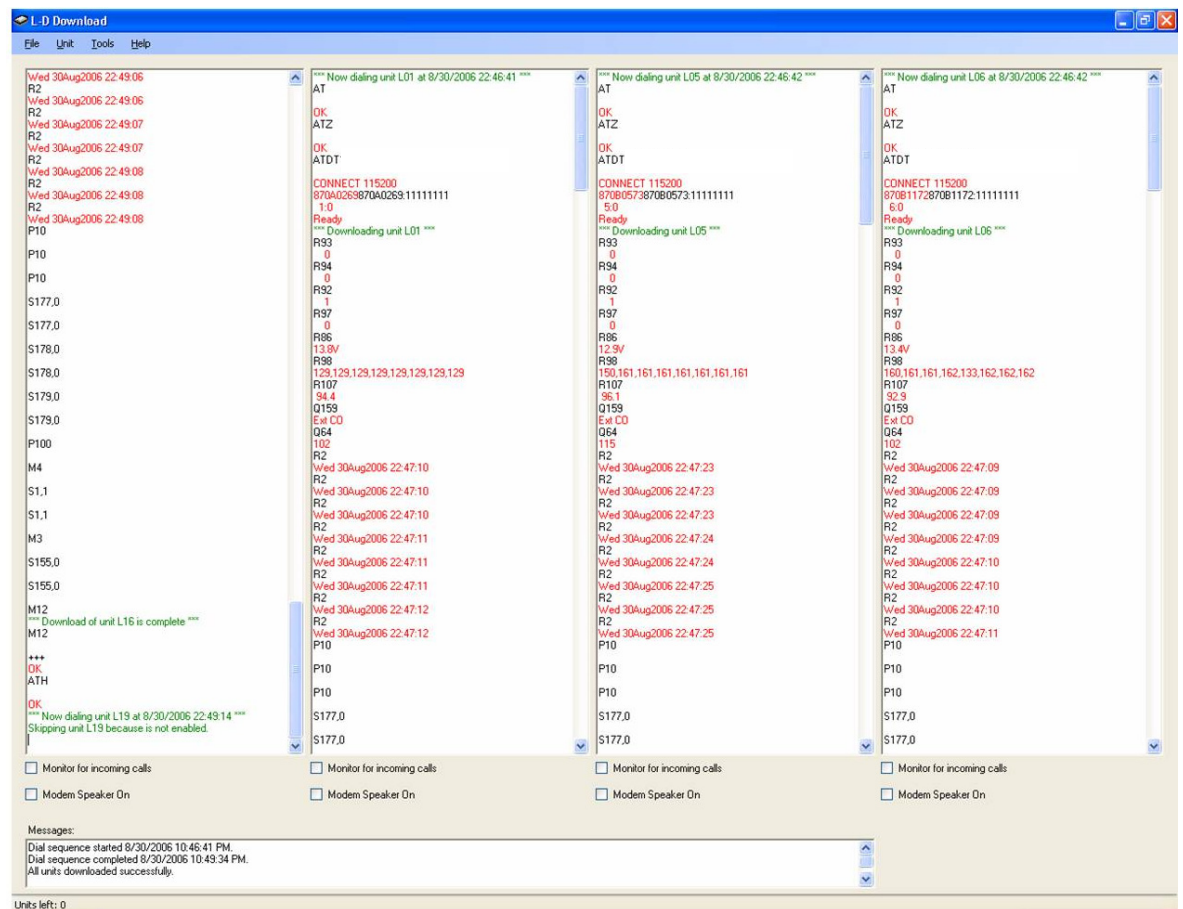
US Army Corps
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ERDC-CERL LD-870 Download Program Developed for Aberdeen Test Center

User's Manual

Ben Niemoeller and Edward T. Nykaza

May 2007



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Abstract: The U.S. Army Engineer Research and Development Center Construction Engineering Research Laboratory has developed software that interfaces with an array of Larson-Davis Model 870 (LD-870) Environmental Noise Monitors for Aberdeen Test Center. This document provides step-by-step instructions for operating the software program used to setup and download data from these noise monitors. It provides a troubleshooting guide for resolving known issues with the monitoring system and contains information regarding modem communications between an LD-870 and the central computer.

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Report Documentation Page

Preface

This study was conducted for Aberdeen Test Center (ATC), Aberdeen Proving Ground, MD, under MIPR6FXXR3A563, “R&D of Military Noise Assessment Tools to Support ATC’s Noise Program.” The ATC technical monitor was Kimberley Fillinger.

The work was performed by the Ecological Processes Branch (CN-N) of the Installations Division (CN), Construction Engineering Research Laboratory (CERL). The CERL Principal Investigator was Edward T. Nykaza. Alan B. Anderson is Chief, CN-N, and Dr. John T. Bandy is Chief, CN. The associated Technical Director was Dr. William D. Severinghaus, CVT. The Deputy Director of CERL is Dr. Kirankumar V. Topudurti, and the Director of CERL is Dr. Ilker Adiguzel.

CERL is an element of the U.S. Army Engineer Research and Development Center (ERDC), U.S. Army Corps of Engineers. The Commander and Executive Director of ERDC is COL Richard B. Jenkins, and the Director of ERDC is Dr. James R. Houston.

1 Introduction

Background

Aberdeen Test Center (ATC) in Maryland has one of the top installation environmental noise programs in the nation. The reason they are at the forefront of environmental noise programs is largely due to the trained staff and number of noise monitors they have located in the communities surrounding the installation. Over the past several years, there have been issues with the reliability of the software used to download data from the noise monitors.

In April 2006 ATC funded the U.S. Army Engineer Research and Development Center Construction Engineering Research Laboratory (ERDC/CERL) to replace the outdated software ATC uses to download and manage the data from their noise monitors. The new software developed by ERDC/CERL was built upon software developed for a research project being conducted at Aberdeen Proving Ground and modified to meet the needs of the ATC staff who run the system on a day-to-day basis. The software went into operation in August 2006.

Objective

The objective of the work was to develop a Windows-based server and database software to download data from ATC's environmental noise monitors.

Approach

This document contains ERDC/CERL's knowledge of the noise monitoring system at Aberdeen Proving Ground. Chapters 2 through 4 document the operation and features of the L-D Download software and database. Chapter 5 documents known issues with the individual monitoring units, while Chapter 6 reports issues with the overall system. Appendices give information on how to set up a modem for use with a unit in the field and the central computer.

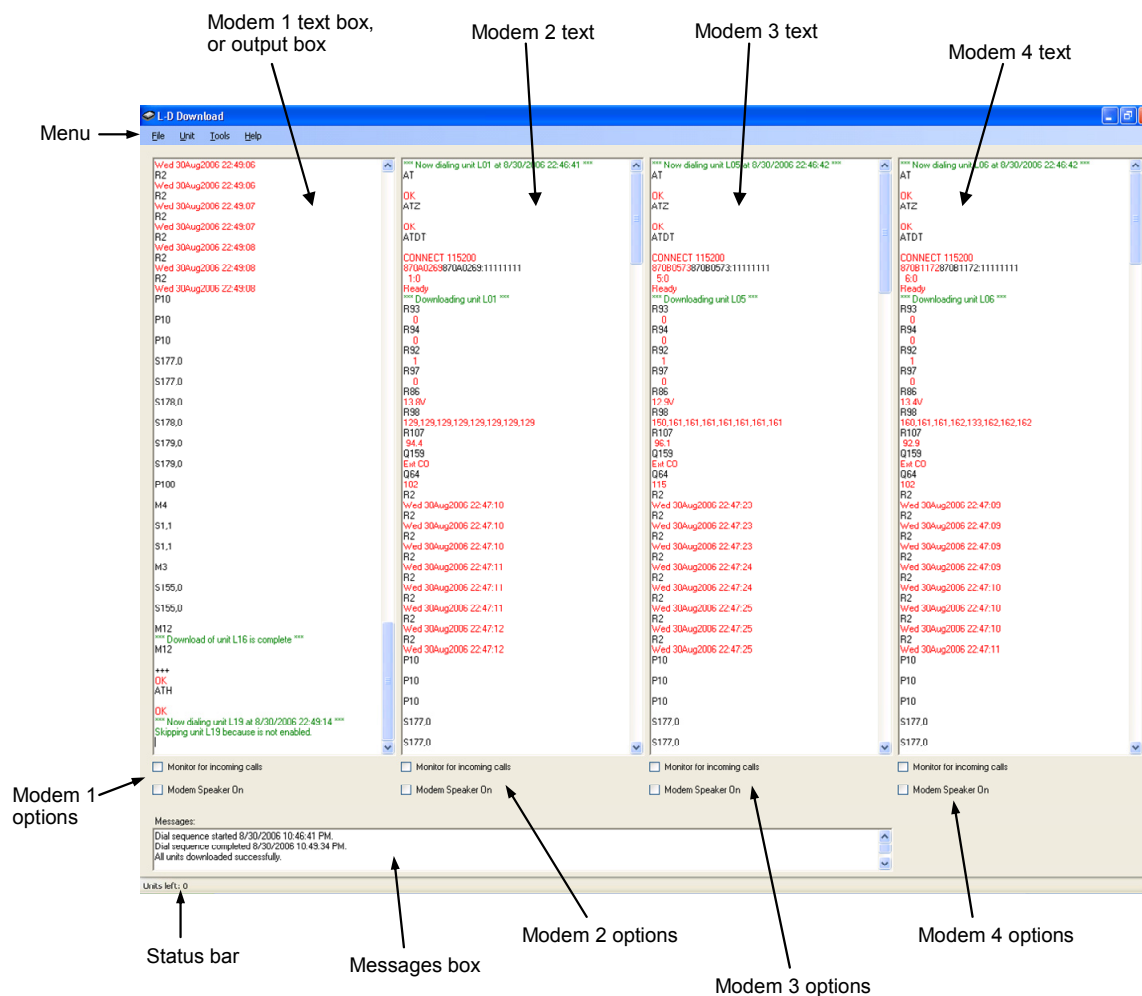
Instructions are illustrated with screen shots where appropriate. The troubleshooting section was written in a question-and-answer format in hopes of helping the operator find the right solution to their problem.

Scope

This report contains operational knowledge of the software and noise monitoring system and is intended to serve as a user manual. A separate report (ERDC/CERL SR-07-7) contains the software code and logic and is intended to be used by programmers who wish to update the software.

2 User Interface

Main window



The modem text boxes display L-D Download's interaction with the 870s and the local and remote modems. Each local modem has one text box.

- Black text is sent from the noise computer. Typically, black text contains commands sent to a local modem (when dialing) or 870 (when connected).
- Red text is received by the noise computer. Typically, red text contains the response from the local modem (when dialing) or 870 (when connected).
- Green text contains comments used to describe program operation to the user. This text is neither sent to nor received from an 870.

Below each modem text box are two check boxes to control that modem's operation.

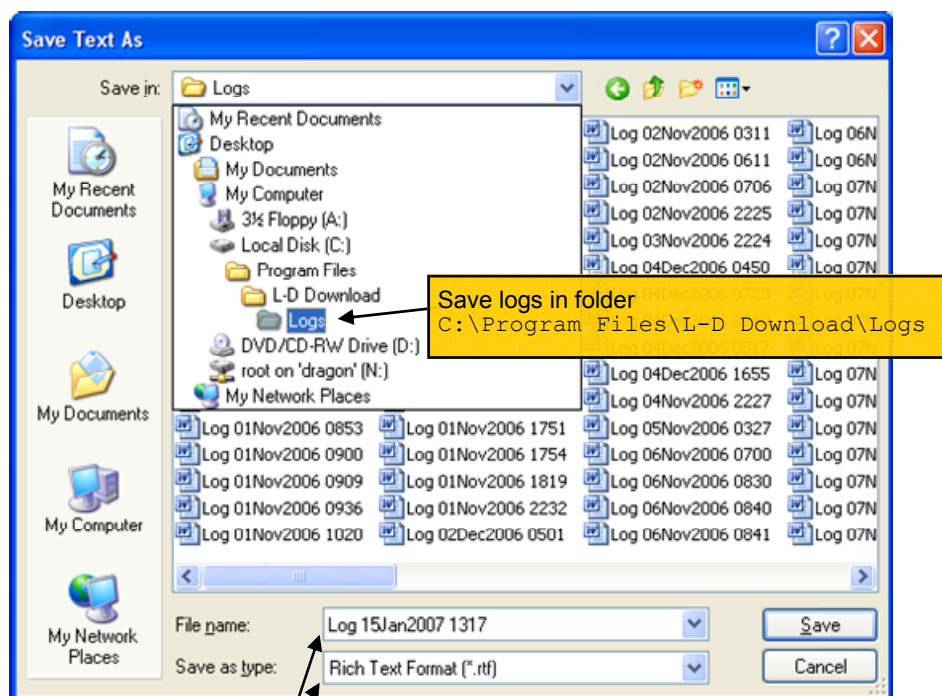
The first box, **Monitor for incoming calls**, switches between using the modem to place calls and using the modem to wait for and receive incoming calls. If **Monitor for incoming calls** is checked, the local modem is instructed to wait for calls coming in from a unit. If this box is unchecked, the local modem may be used to place a call out to a unit.

The second check box is labeled **Modem Speaker On**. When this box is checked prior to placing or receiving a call, the modem speaker will turn on. This can be useful for diagnosing problems with a telephone line.

The **Messages Box** shows the beginning and ending times of a download sequence, and which units, if any, the program was unable to download.

File menu

- **Save Text As** – Saves all of the text accumulated in the four modem text boxes, as well as the Messages box, to a file. Logs should be saved in the folder C:\Program Files\L-D Download\Logs.

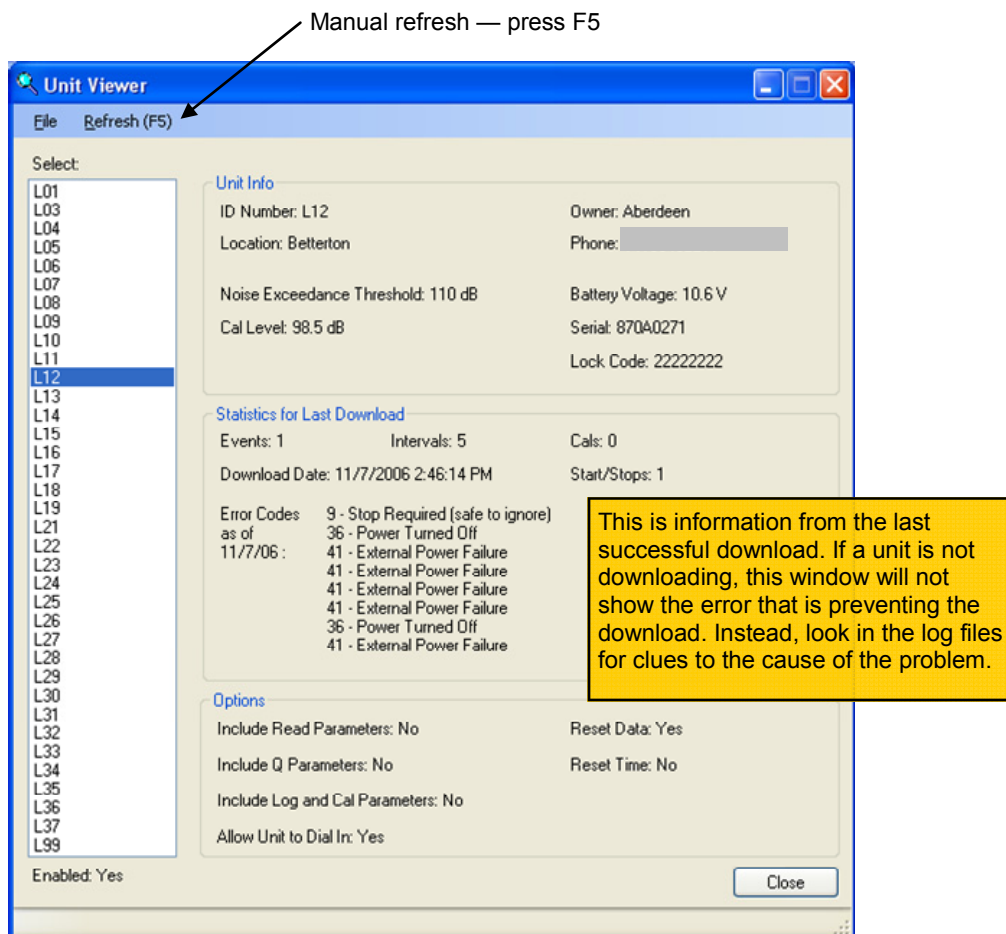


Default file name:
Log MMddyyyy hhmm.rtf

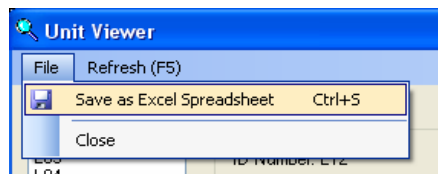
- **Exit** – The only way to exit L-D Download. Clicking the red X will minimize the main window to the task tray; it will not close the program. Before you exit the program, make sure that none of the modems are in the process of downloading units. It may be necessary to un-check **Monitor for incoming calls** and/or click the **Cancel Downloads** button to stop the modems from downloading units.

Unit menu

- **Manual Dial** – Selects one or more units to download. For more details, see the Common Tasks section. When this window is open, L-D Download is unable to accept incoming calls and perform scheduled downloads.
- **View Units** – View statistics and information about the units. This window may stay open indefinitely without interfering with program operation and will update automatically as units call in and download.



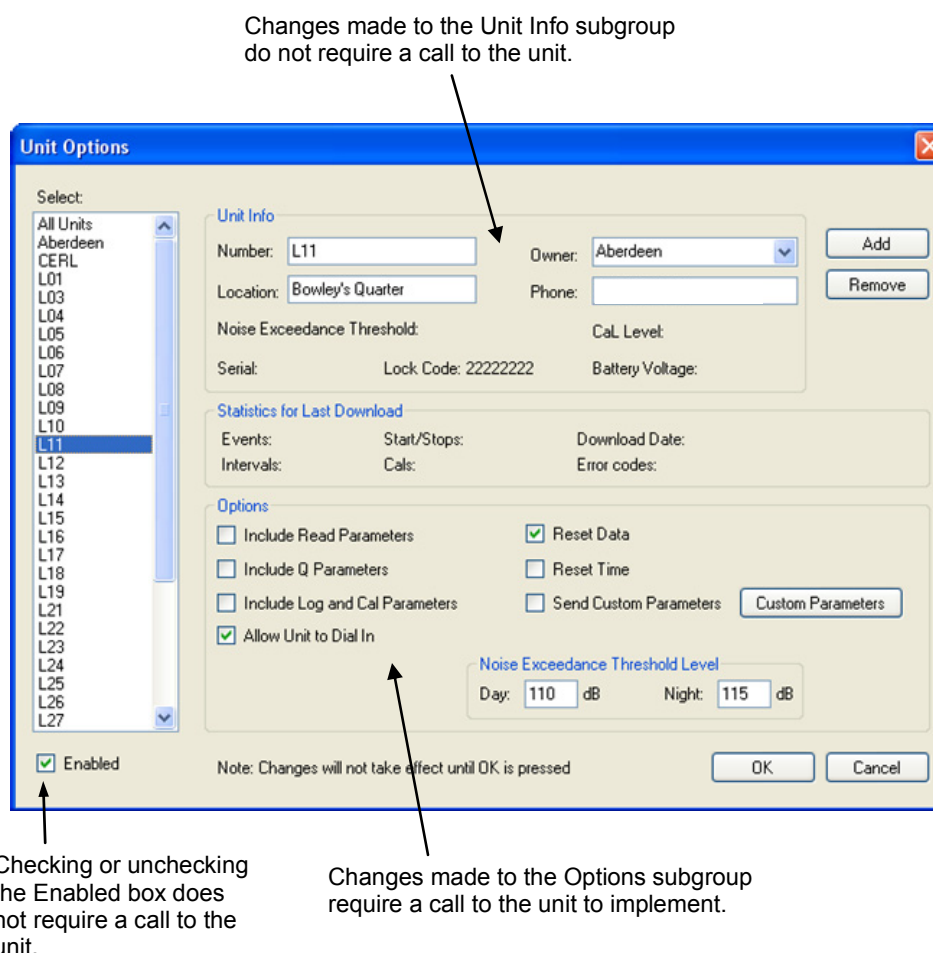
You can export the data in the Unit Viewer as an Excel 2003 spreadsheet. To do this, click **File | Save as Excel Spreadsheet**,



choose a file location, and click Save. The spreadsheet can now be opened in Excel 2003. Unfortunately, since the spreadsheet was created using XML, the file cannot be opened in earlier versions of Excel.

	A	B	C	D	E	F	G	H
1	Unit ID	Download Date	Unit set to dial in	Data reset	Time reset	Events	Intvs	Status
2	L01	11/7/2006 09:14:27	Yes	Yes	No	0	0	
3	L03	11/7/2006 12:56:17	Yes	Yes	No	1	3	
4	L04	11/7/2006 12:59:42	Yes	Yes	No	1	3	
5	L05	11/7/2006 16:14:23	Yes	Yes	No	1	0	
6	L06	11/7/2006 16:59:25	Yes	Yes	No	1	0	
7	L07	11/7/2006 16:59:22	Yes	Yes	No	1	0	
8	L08	11/7/2006 09:15:30	Yes	Yes	No	0	4	
9	L09	11/7/2006 16:59:28	Yes	Yes	No	1	0	
10	L10	11/7/2006 14:43:33	Yes	Yes	No	1	1	
11	L11	11/7/2006 14:42:39	Yes	Yes	No	1	5	
12	L12	11/7/2006 14:46:14	Yes	Yes	No	1	5	
13	L13	11/3/2006 22:10:43	Yes	Yes	Yes	0	12	
14	L14	11/7/2006 17:02:53	Yes	Yes	No	1	1	
15	L15	11/7/2006 14:42:32	Yes	Yes	No	1	5	
16	L16	11/7/2006 14:43:40	Yes	Yes	No	1	0	

Unit Options – Select and change settings on a unit or group of units. Some options require a call to the unit(s) to be implemented – see below:



For example, to reset the clock on units 11 and 12:

1. Click unit **L11** in the left-hand pane.
2. Check the **Reset Time** check box.
3. Click unit **L12** in the left-hand pane. Notice the Reset Time check box is now unchecked.
4. Check the Reset Time check box.

If you are satisfied with these settings, click **OK**. To undo the changes you made, click **Cancel**.

To reset the time on all Aberdeen units *except* 11 and 12:

1. Click **Aberdeen** in the left-hand pane. Check the **Reset Time** check box.
2. Click unit **L11** in the left-hand pane. You will notice that every setting under the Options subgroup, except Exceedance Level, has been copied to this unit.

3. Uncheck the Reset Time check box on the Unit Options screen.
4. Click unit **L12** in the left-hand pane.
5. Uncheck the Reset Time check box.

To add a new unit, click **Add**. All the settings you see on the screen will be copied to a new Unit and added to the bottom of the list. For example, if you were to click Add on the above screen, a new unit with number L11, location Bowley's Quarter, etc. will be added to the list in the left-hand pane. The number of a new unit must begin with a capital L and be followed by two digits (i.e., L01 through L99 are the numbers to use).

To delete a unit from the list, select that unit and click **Remove**. Clicking **Cancel** will restore the unit to the list, in case you clicked Remove accidentally.

There are a couple quirks you should be aware of:

- The Exceedance Level will not be changed unless Reset Data is also checked.
- Sometimes the program will store duplicate copies of a unit in the Unit List. This will not affect the integrity of the data received from a unit, but it may result in undesired program operation. If you see multiple copies of a unit in the list, delete the duplicates.
- Use caution when making a change to the All Units, Aberdeen or CERL groupings. All settings in the Options subgroup (except Exceedance Level and Enabled) will be copied to each of the units in the grouping you selected. Sometimes this will cause settings for individual units to change unexpectedly.
- **WHEN UNIT OPTIONS IS OPEN, NO CALLS CAN BE MADE OR RECEIVED BY L-D DOWNLOAD.** If a unit calls in, the call will not be answered. Please use Unit Options to make changes to settings only and do not leave the window sitting open. If you need to view information about a particular unit only, use Unit Viewer instead.

Click **OK** to save your changes, **Cancel** to discard changes. Clicking the red X in the upper-right-hand corner of the window has the same effect as pressing Cancel.

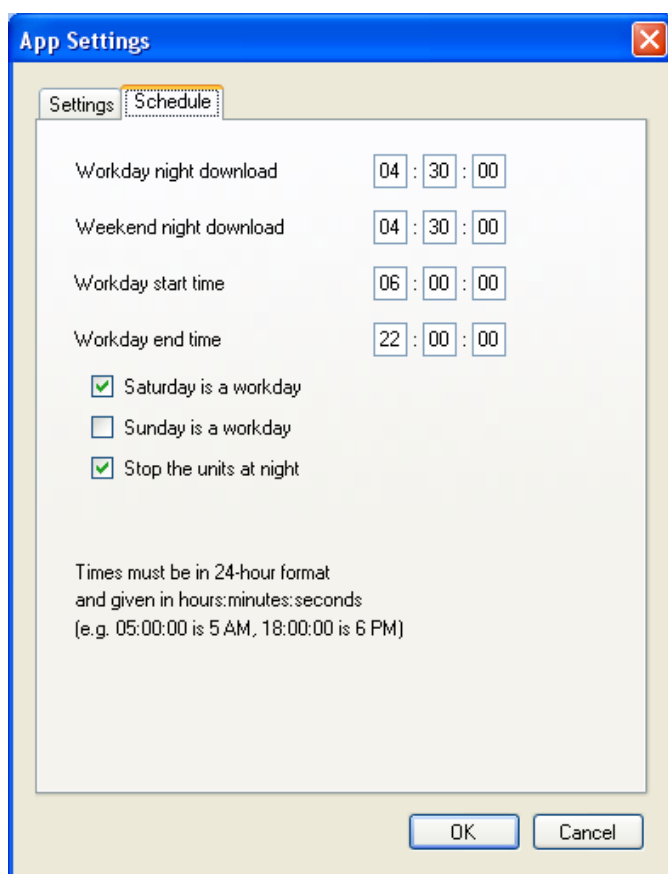
Tools menu

- **Database Viewer** – Launches a copy of the Database Viewer. This is the same program that is launched by double-clicking the icon on the desktop.
- **Settings and Schedule** – Use this to change application-wide **settings**. You can also change the time of the scheduled weekday and weekend downloads, as well as set the times during which you want the system to monitor and report events. Click **OK** to save your changes or **Cancel** to discard them. See Chapter 3, Settings Guide, for information about which settings take effect immediately and which require more action on the part of the user.

In the **Schedule** tab, you can change the time during which the units collect data, the time at which to perform the nightly maintenance download, and whether or not to collect data on Saturday and Sunday.

The **workday start** and **end** times are the times of day you want the units to start and stop taking data. The default is to start taking data at 6 a.m. and stop taking data at 10 p.m. If you decide to change the start or end times of a workday (day with range operations present), you will need to call all of the units.

The **workday** and **weekend night downloads** are maintenance downloads done each night. The CERL units have their data downloaded at this time, and all units have their clocks synchronized to the noise computer's clock. Additionally, on the weekend, the read and Q parameters of each unit are downloaded and recorded to track the configuration of each unit. The default time at which to perform this download is 4:30 a.m.



If there will be range operations on Saturday, check **Saturday is a workday**. If there will be range operations on Sunday, check **Sunday is a workday**. If both Saturday and Sunday are designated as workdays, the weekend download will never be performed, which means the R and Q parameters will not be downloaded automatically by L-D Download. The default is Saturday is a workday, while Sunday is not.

To keep the units stopped at night after a night download, check **Stop the units at night**. If this box is unchecked, the units will be told to collect data following a night download.

Help menu

The Help menu is not yet functional. This manual is your source for help.

3 Settings Guide

Settings which require a call to the unit to take effect:

in Unit Options

Day exceedance threshold
Night exceedance threshold
Allow unit to call in
Reset data
Reset time

in Settings and Schedule

Timer start/stop (Workday Start/End)
Noise office phone number (Modem 1, 2, 3, 4 Phone Numbers)

After making these changes, call the units affected. Changes will not be made until you call the units.

Settings which take effect immediately:

in Unit Options

Unit phone number
Unit ID number
Unit location
Unit owner

in Settings and Schedule

Install Path
Number of dial attempts before giving up
Max. number of lines to display in the main window
Weekday night download time
Weekend night download time

All modems have the same phone number check box

Limit connection speed to 9600 bps check box

Save log file check box

Saturday is a workday check box

Sunday is a workday check box

Stop the units at night check box

Settings which require a program restart to take effect:

Modem port

Default Settings:

The image displays two side-by-side screenshots of the 'App Settings' dialog box, showing the 'Settings' and 'Schedule' tabs.

Left Screenshot (Settings Tab):

- Install Path:** C:\Program Files\L-D Download\ (with a Browse button)
- Number of dial attempts before giving up:** 5
- Max number of lines to display in the main window:** 1000
- Modem 1 Port:** COM10 (dropdown), **Phone #:** (text field)
- Modem 2 Port:** COM11 (dropdown), **Phone #:** (text field)
- Modem 3 Port:** COM12 (dropdown), **Phone #:** (text field)
- Modem 4 Port:** COM13 (dropdown), **Phone #:** (text field)
- ☒ All modems have the same phone number
- ☒ Limit connection speed to 9600 bps (improves reliability)
- When download is complete:**
 - ☒ Save log file
- Note:** Program must be restarted for port changes to take effect. All other changes are effective immediately.

Right Screenshot (Schedule Tab):

- Workday night download:** 04 : 30 : 00
- Weekend night download:** 04 : 30 : 00
- Workday start time:** 06 : 00 : 00
- Workday end time:** 22 : 00 : 00
- ☒ Saturday is a workday
- ☐ Sunday is a workday
- ☒ Stop the units at night
- Times must be in 24-hour format and given in hours:minutes:seconds (e.g. 05:00:00 is 5 AM, 18:00:00 is 6 PM)**

4 Tasks

Manually dial a unit using L-D Download

L-D Download uses the same four modems to place calls to the units as it uses to receive calls from the units. This allows the program to call many units at once without needing extra telephone lines. However, the user must switch between using a modem to call *out to* a unit and using that modem to receive calls *from* units.

Also, when a unit in the field needs to call in, it dials modem 3. If modem 3 is busy, the ATC telephone system rolls the call over to modem 2, then 1, and finally 4. This means that modem 3 receives incoming calls frequently, while modem 4 will receive few calls. Using modem 4 to call out will impact L-D Download's ability to receive calls only a little, whereas using modem 3 to dial out will greatly hinder the program's ability to receive calls.

During the day, L-D Download is normally set to receive calls from units. To manually dial a unit:

1. First, uncheck the **Monitor for incoming calls** check box for modem 4. If you need more modems to call the units, uncheck modems 1, 2, and, if necessary, 3.
2. Next, click **Unit | Manual Dial** or press **Ctrl-D**. You will see a drop-down list of units to call. Select the unit or group of units you want to dial.
3. Below the drop-down menu is a box called **Initialize**. Checking the Initialize box will erase the data on the unit and reset the Q parameters of the selected unit to its default values. The data from the unit will not be downloaded. If the program is continuously rejecting data from a unit, initializing that unit may remedy the problem. Normally this box should stay unchecked.
4. To call additional units, click **Unit | Manual Dial** again. The drop-down list will be shorter than before; it omits units that are queued up to be downloaded. Select another unit or group of units to be downloaded and click **OK**. The selected units will be added to the end of the download queue.

Once the end of the download queue is reached, L-D Download will automatically switch all of the modems to monitor for incoming calls. Also, if

you uncheck a **Monitor for incoming calls** box and leave it unchecked without dialing a unit, L-D Download will re-check the box after 30 minutes.

Manually dial a unit using HyperTerminal

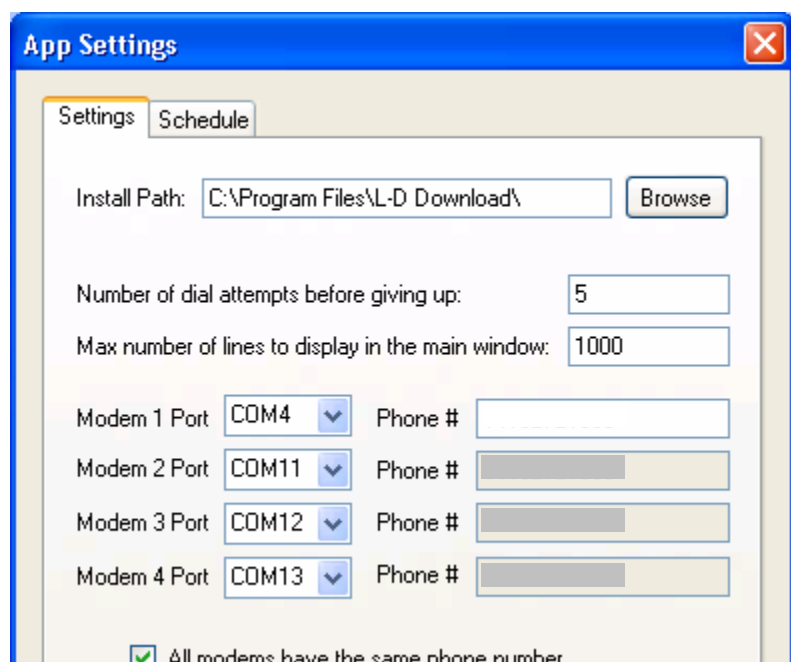
Sometimes a unit will accumulate so much data that it becomes impossible to download it. One solution is to open **Manual Dial** and call the unit with the **Initialize** box checked. When L-D Download connects to the unit, the first commands sent will be **m4** (stop) and **s1,1** (reset data). Once these commands are sent, click **Cancel Downloads**, then call the unit again with the **Initialize** box unchecked.

If the unit cannot be reset through the Initialize procedure, it will need to be called using HyperTerminal. The two ways to do this are outlined below.

If five modems are available:

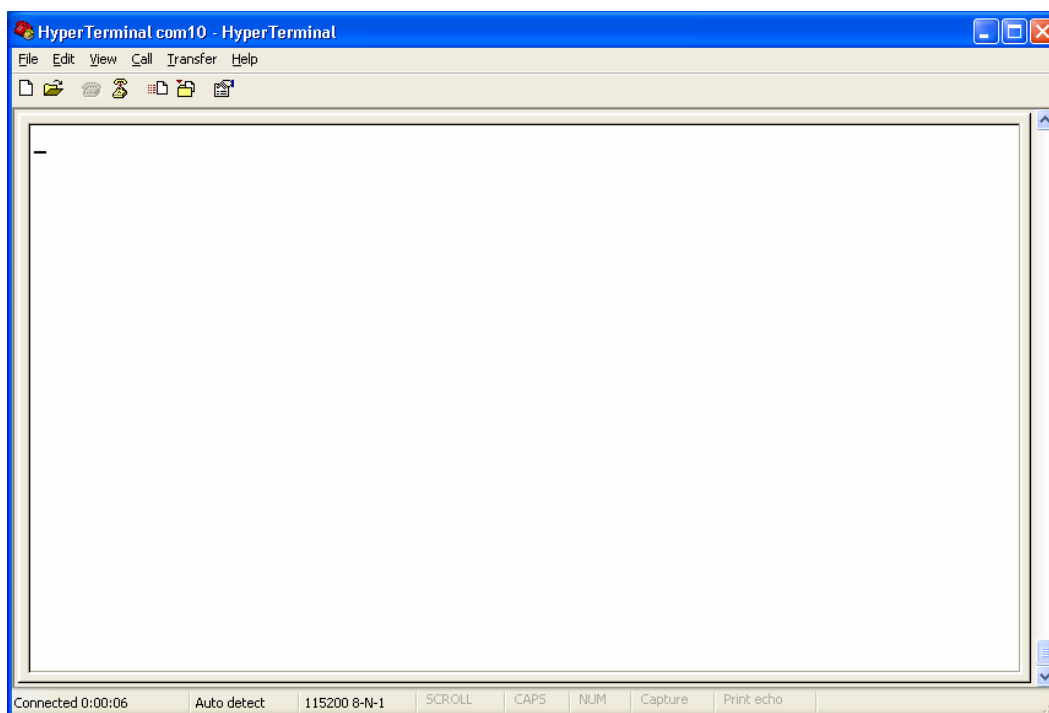
1. The noise computer has five modems on it. Four of these modems are used at any one time by L-D Download. So, the first step is to identify which modems are being used by the download program, then run HyperTerminal on the modem that is not being used.

To do this, open **Tools | Settings and Schedule** in L-D Download.

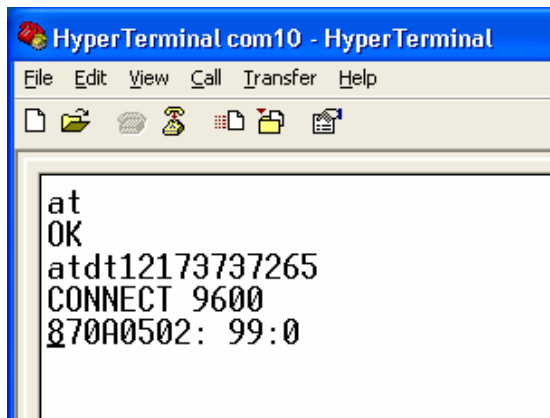


The modems in the noise computer are on serial ports COM4, 10, 11, 12 and 13. In the example shown, the download program says it is using the modems on COM4, 11, 12, and 13. This means that COM10 is the free modem. Close Settings and Schedule (click Cancel or the red X).

2. Double-click the **HyperTerminal** icon on the desktop. This will open a folder that contains files for launching HyperTerminal on each of the serial ports on the noise computer. To launch HyperTerminal on serial port COM10, double-click **HyperTerminal com10.ht**. You should see a window like this:



3. Click back to L-D Download and click **Unit | View Units**. Click on the number of the unit you want to dial, and the unit viewer will display the telephone number of that unit.
4. In HyperTerminal, type **AT** and press Enter. If the modem is working, it will respond with **OK**.
5. To dial a unit, type **ATDT<phone number>** and press Enter. For example, to dial unit 8, type **ATDT14107789023** and press Enter. The modem will dial and squeal and eventually respond with **CONNECT <some number>**. If the modem responds with **NO CARRIER** or **BUSY**, wait a minute, then dial the modem again.
6. A few seconds after the Connect message is shown, the 870 will give a password prompt:



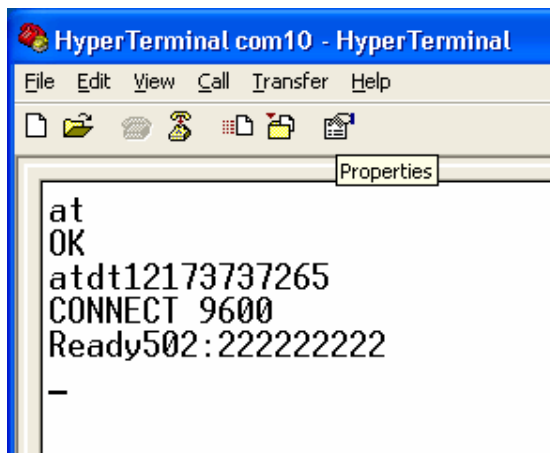
The first eight characters in the password prompt (870xxxxx) is the serial number of the unit. The password you type in is:

`<serial>:22222222<enter>`

So, if the serial number is 870A0502, you must type 870A0502:22222222 (with a capital A) and hit Enter. On the screen, you will appear to type over the password prompt, which is confusing the first time you do it. If you type the password in wrong, the unit will respond with another password prompt. If you type the password incorrectly four times, the unit will hang up.

Also, you need to type fairly quickly: if you wait more than 5 seconds between keystrokes, the unit sends another password prompt (and wipes out the password you had typed thus far).

7. Once you enter the password correctly, the unit will respond with Ready, again on top of the prompt and your typed password:



At this point, you are ready to enter commands to the unit.

To reset the unit, type:

```
M4<enter>
S1,1<enter>
M3<enter>
```

Note that, if you do not send a command to the unit within about 30 seconds, the unit will hang up and you will have to dial it all over again. This is why we have this nice program to dial the units for us.

8. When you are done, type **m12** and hit Enter. The 870 will hang up the modem on its end, and the HyperTerminal window will say **NO CARRIER**.

Remember to close the HyperTerminal window when you are done. When it asks you if you are sure you want to disconnect, click Yes.

If four modems are available:

1. Open **Unit Options** and click on the number of the unit you want to dial to pull up that unit's phone number.
2. Leave the Unit Options window **open**. This will suspend operation of L-D Download, preventing conflicts between HyperTerminal and L-D Download.
3. Double-click the **HyperTerminal** icon on the desktop. This will open a folder that contains files for launching HyperTerminal on each of the serial ports on the noise computer. Double-click the file **HyperTerminal com4.ht**.
4. Follow steps 4-8 in the instructions for five available modems.
5. After closing HyperTerminal, close Unit Options.

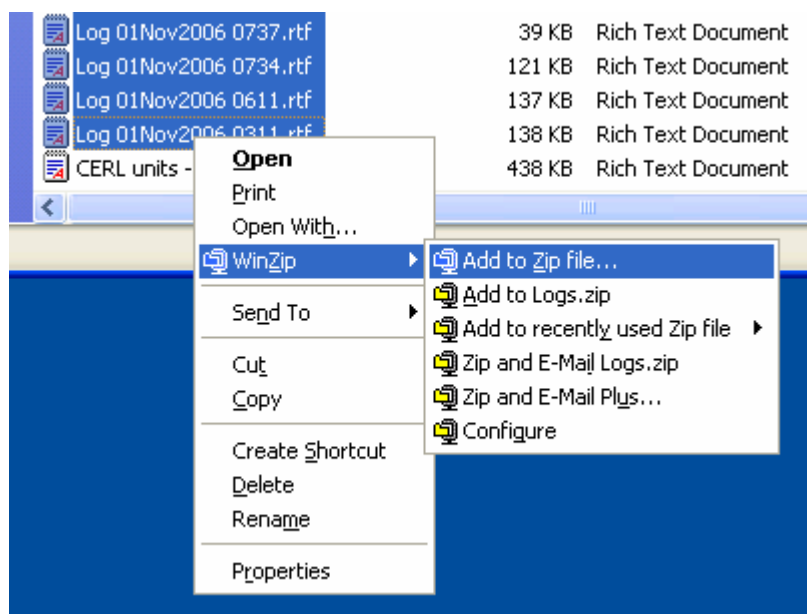
Archive the log files

Once a month, the log files generated by L-D Download should be compressed into a Zip file. This will make it easier to find a particular log file, as well as reduce disk use and clutter.

1. From the desktop, double-click the **Logs** folder to open it. The files should be sorted in descending order according to date.
2. Click on the last file written in a particular month to select it.

Log 01Dec2006 0715.rtf	23 KB	Rich Text Document	12/1/2006 7:15 AM
Log 01Dec2006 0451.rtf	155 KB	Rich Text Document	12/1/2006 4:51 AM
Log 30Nov2006 1506.rtf	234 KB	Rich Text Document	11/30/2006 3:06 PM
Log 30Nov2006 1002.rtf	10 KB	Rich Text Document	11/30/2006 10:02 AM
Log 30Nov2006 0741.rtf	4 KB	Rich Text Document	11/30/2006 7:41 AM

3. Scroll down the page and, while holding the shift key, click on the first file written that month. Holding down the shift key selects all the files between the two you selected with the mouse.
4. While hovering the mouse over the selected block of files, right-click, select WinZip, and click Add to Zip File.



5. WinZip will prompt you for a filename. In the section marked **Add to archive**, type `logs <month> <year>` at the end of the file path given. Click Add.
6. Close WinZip once it has finished compressing the files. Delete the still-selected log files in the Explorer window (the window you opened when you double-clicked the Logs icon).

5 Troubleshooting/FAQ – Units

Units are calling in very frequently

Is it a windy or stormy day? Wind causes false triggering of the LD-870 noise meters. Many false triggers will occur on windy days, and the units will call in randomly and frequently. One can expect wind to trigger noise events (exceedances) with an unweighted or flat-weighted peak of 100-120 decibels (dB).

- If it is a windy day, make the Aberdeen units call in less frequently by raising their exceedance threshold. To do this:
 1. Open Unit Options (click **Unit | Unit Options** or press **F8**).
 2. In the left-hand pane, select **Aberdeen**.
 3. Under Noise Exceedance Threshold Level, write down the current Day exceedance value. Raise the Day value to 115 dB or higher.
 4. Click **OK**. As the units call in, they will have their threshold levels changed to the new value. No further action is needed.

Keep in mind that raising the threshold level will reduce the system's sensitivity to actual blast events. When the wind stops, the threshold level should be changed back to the original value you wrote down in step 3.

- If it is not windy, look in the Database Viewer to see which units have posted the most recent events. If one or two units are posting an unrealistically high number of events, a noise source could be local to those units. Try raising the exceedance threshold of just those units:
 1. Open Unit Options.
 2. In the left-hand pane, select a unit that is generating a lot of events.
 3. Under Noise Exceedance Threshold Level, write down the current Day exceedance value. Raise the Day value to 115 dB or higher.
 4. Repeat steps 2 and 3 for the other units that are posting too many events.
 5. Click **OK**. As the units call in, they will have their threshold levels changed to the new value. No further action is needed.

Note that by setting the threshold high, you are effectively removing that unit from the noise monitoring system.

Do not uncheck the Enabled box for a unit that is calling in frequently. The Enabled box is used to prevent the program from dialing a malfunctioning unit during a scheduled download. It has no effect on the unit's ability to call the noise computer.

No unit has called in for at least an hour

On a fair-weather day with little activity on post, it is common for 1 or 2 hours to pass with no events. To see if the system is otherwise functional:

- Verify the morning cal shot was received. Most mornings, two or three units will be able to record the noise from the cal shot.
- Verify the Aberdeen units are set to a moderate threshold level (100–110 dB). To view the threshold values for the different units, click **Unit | View Units** or press **F7**. To set units to new threshold values:
 1. Open Unit Options (click **Unit | Unit Options** or press **F8**).
 2. In the left-hand pane, select the units you want to change.
 3. The Day value under Noise Exceedance Threshold Level sets the overall exceedance level. (Night is no longer used — the unit is told to stop monitoring at night via the timer function.) Set the Day value to the new threshold level.
 4. Repeat steps 2 and 3 for the other units you want to change.
 5. Click **OK**.
 6. Since the units are not dialing in, you will need to manually commit the changes to the units. In the main window, uncheck **Monitor for incoming calls** for the first and fourth modems, then issue a Manual Dial to the affected unit or units.

One unit is calling in excessively and continuously posting readings above 120 dB

Several common things could cause this scenario:

- A loud noise source, such as a lawn mower or construction equipment, is within a few yards of the noise meter's microphone. If this is the case, the events will stop after a few hours.

- Some units, such as Stoops, are very exposed to wind and weather. These units may require that their daytime threshold levels be raised above 110 dB.
- If the unit continues to post exceedance levels over 120 dB for several days, even in calm weather, the unit may need service.

If the frequent calling is preventing other units from calling in, raise the exceedance threshold of the errant unit to a high level to stop it from triggering.

Do not uncheck the Enabled box for a unit that is calling in frequently. The Enabled box is used to prevent the program from dialing a malfunctioning unit during a scheduled download. It has no effect on the unit's ability to call the noise computer.

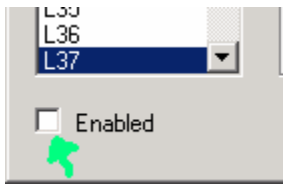
Unit is dialed, modem responds with “No Carrier”

No Carrier means that the local and remote modems were unable to establish a data connection. Common causes of a persistent No Carrier condition are:

- The remote modem will not answer the incoming call.
- The remote modem answers the incoming call, but does not start the connection sequence.
- The remote modem answers the call and the two modems squeal, but they are unable to negotiate a connection between each other.

In each of the above cases, if the local modem cannot make a connection to the remote modem within around 60 seconds, the local modem will hang up and display No Carrier on screen. The remedy to the first two cases is to power cycle (turn off and then on) the remote modem. The third case is most likely to occur during a storm and is due to noise on the telephone line.

If a unit persistently gives a No Carrier when it is polled, you can elect to have the program not poll the unit. To do this, click **Unit | Unit Options** or press **F8**. Select the appropriate unit in the left-hand pane, and uncheck the **Enabled** box for that unit.



Occasionally you will see a No Carrier just after a dial command is issued, or just after one of the modems has been instructed to monitor the line for incoming calls. Do not worry about an occasional No Carrier.

Unit is dialed, modem responds with “Busy”

“Busy” means the local modem dialed the remote modem and received a busy signal, indicating that the remote modem is off-hook. Common causes of a busy signal are:

- The remote modem/870 could be dialing in to the noise computer.
- The remote modem/870 could be connected to another computer, such as the complaint computer at CERL.

If one particular unit persistently reports a Busy signal, the remote modem may need to be power cycled.

The message “Error: Unit is being accessed by another part of the program” is seen on screen

This message is seen when a unit calls in, identifies itself, and the program is unable to retrieve the necessary information about that unit. Common causes of this condition are:

- The unit is being called by another modem at the same time the unit itself has dialed in. Click Unit | View Units or press F7 to open the Unit Viewer. Select the unit in the left-hand pane. If the unit’s Download Date says In Progress, the unit is being called by another modem.
- The unit is missing. Open Unit Options and look for the unit in the left-hand pane. If the unit is not there, it will need to be added back to the list.
- The Manual Dial window is open. If you are not using Manual Dial to call a unit, close Manual Dial.

6 Troubleshooting/FAQ – System

Issues with the L-D Download and Database Viewer software

I’ve opened Unit Options and one of the units is missing. What should I do?

Two things can be done to put the missing unit back into the list:

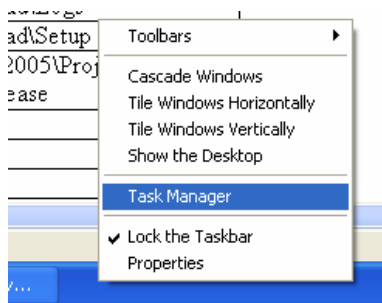
1. Close L-D Download. Open Windows Explorer, go to the L-D Download program folder, and delete the file **units.dat**. Restart L-D Download.

Note that this method will cause all of the settings in Unit Options to be lost. This method should be used only if there are many missing or duplicate units in the list.

2. Open Unit Options. Type in the number, location, telephone number, and owner of the missing unit and click Add. The new unit will appear at the bottom of the list.

One or more of the local modems is not responsive. L-D Download says “Now dialing unit X” and no more text is displayed.

1. Make sure HyperTerminal is not running. To see if another user is running HyperTerminal, right-click on an empty area of the taskbar and select **Task Manager**.



Click on the **Processes** tab, and look for a program called **hypertrm.exe**. Right-click on the program name and select **End Process**. When it asks you to confirm, click **Yes**. Close the task manager.

2. Sometimes, for various reasons, the noise computer has trouble communicating with the Control modem card. This is best solved by rebooting the noise computer.

When is it safe to close L-D Download (in order to restart the computer, etc.)?

L-D Download can be safely shut down when no units are being downloaded. If it is a busy day, uncheck **Monitor for incoming calls** on each of the four modems and wait for each modem to finish and hang up. Now close L-D Download.

No data appears in the database viewer – I see only a gray screen.

1. You are viewing “Today’s Exceedances” between midnight and 6 a.m. Use the “Yesterday’s Exceedances” view instead.
2. If you are looking for a specific date, make sure that the start date occurs before the end date. Also, if you are searching for a narrow range of dates, it is entirely likely that no events were recorded within that range. Try searching across a wider range of dates.

L-D Download will not start – help!!!

Check to see if the program **VB test project.exe** is already running.

- Clicking the Minimize or Close box minimizes L-D Download to the system tray. Its icon is a gray modem:



- If the icon is not present and you still cannot launch L-D Download, another user may be running the program. Open the Task Manager, click on the **Processes** tab, and look for a program called **VB test project.exe**. If you see **VB test project.exe** running under the user NOISE, a remote user is running tests on the program while logged in as NOISE.

If you see **VB test project.exe** running under a user other than NOISE, right-click on **VB test project.exe** and click **End Process**.

No one besides NOISE should run this program. Now restart the program while logged in locally as NOISE.

L-D Download indicates that it completed a scheduled download, but the logs and the data in Unit Options suggest that no units downloaded.

Either the Unit Options window or the Manual Dial window was open during the time the download was scheduled to occur. The units were not downloaded; you will need to download them manually. Please close the Manual Dial and Unit Options windows when you are not using them. The Unit Viewer, on the other hand, can be left open indefinitely without affecting download operation.

Issues with the noise computer

This “Automatic Updates” window keeps popping up, telling me to restart the computer. What should I do?

Wait for a noncritical part of the day, then close L-D Download (safely, as described above) and restart the computer. Once the computer boots, restart L-D Download and Database Viewer. Check Monitor for incoming calls for each of the four modems.

How do I contact Dell tech support?

CERL (or USACE) has a premium phone support contract with Dell. The Helpdesk will be able to direct you further. The Dell service tag number is:

Service Tag: 1V59Z91

Express Service Code: 4060097461

Restoring the Complaint database

The Complaint database is unreadable or missing records. How do I restore it?

SQL Server 2005 is set up to make a backup of the Complaint database every hour, at 58 minutes past the hour. The backup file is D:\Complaint.bkf. To restore the data from the backup file:

1. Close down all programs which access the database. This includes L-D Download, Database Viewer, and Visual Studio.
2. Open SQL Server Management Studio. Click on the plus sign next to the Databases folder to expand it.
3. Right-click on the Complaint database. Select **Tasks | Take Offline** from the popup menu.

If this step fails, make sure that no programs that use the database are open and no query or results windows are open in the management studio. Also make sure there is a “plus” sign next to the Complaint database icon in the left hand pane – the tree of items contained in the Complaint database needs to be collapsed down and not visible.

4. Step 3 was a test to make sure that no other programs are using the database. Bring the database back online by right-clicking the Complaint database and selecting **Tasks | Bring Online**.
5. Right-click on the Complaint database again, and select **Tasks | Restore | Database....** Under Source for Restore, select **From device** and click on the ‘...’ button. Select **File** as the backup media, then click **Add**.
6. In this Locate Backup File dialog box, scroll down and click on the **D:** folder. Under files of type, select **All Files(*)**. Look for a file called **Complaint.bkf**, select it, and click **OK**. Click **OK** again.
7. Back in the Restore Database window, look for an area called **Select the backup sets to restore**, then check the box under the **Restore** column.
8. On the left-hand side of this window, select **Options**. Check **Overwrite the existing database** under ‘Restore options’. Also, make sure the topmost of the three ‘Recovery state’ options is selected; this option ends with (RESTORE WITH RECOVERY).
9. Click **OK** and wait while SQL Server loads in the data from the file.

This procedure was tested on an existing “Complaint” database created in SQL Server, and will work if you need to restore records from a backup. If you had to reinstall the operating system, you will need to create the database tables before restoring the data into them. To create the database tables from scratch, open up SQL Server Management Studio and run the script **Create complaint db.sql**, located in the **Documentation\SQL scripts** folder. Then, following steps 1-9 above, load the data from the backup files into the database.

Setting up a new modem for use in the field

I have a brand new modem. How do I set it up for use in the field?

Most modems now in the field are Multitech consumer modems, and the modems to use in the future are Multitech MultiModem IND outdoor-temperature modems. To set up a Multitech modem:

1. Connect the modem to the serial port on the back of the noise computer.
2. Double click on the “HyperTerminal COM1.ht” icon on the desktop.
3. Type **AT** into the HyperTerminal window and hit Enter. An OK response means you are connected to the modem.
4. Type **ATE <enter>** to make the modem stop echoing typed characters back to you.
5. Copy the modem string from the [modem-870 info](#) document onto the Clipboard. The string is currently:

AT&F X4EoQoVoT M1Bo So=5 S6=3 S7=65 S10=100 S30=5 S37=9 &Do&W

Then click the HyperTerminal window, select **Edit | Paste to Host**, then press Enter. Pressing Ctrl-V does not work in HyperTerminal.

6. To verify that the settings are stored correctly:
 - Unplug the modem’s power cord, wait about 30 seconds, then plug it back in.
 - Type the command **AT&V** and press Enter. You will get a list of the modem’s settings. Make sure the list matches the one below. The important parameters are in **bold**:

Option	Selection	AT Cmd
-----	-----	-----
Comm Standard	CCITT	B
CommandCharEcho	Disabled	E
Speaker Volume	Medium	L
Speaker Control	OnUntilCarrier	M
Handshake Speed	Fall Back Ena	N
Result Codes	Enabled	Q
Dialer Type	Tone	T/P
ResultCode Form	Number	V
ExtendResultCode	Enabled	X
DialTone Detect	Enabled	X
BusyTone Detect	Enabled	X
CDC Action	Standard RS232	&C
DTR Action	Ignore	&D

Press any key to continue; ESC to quit.

Option	Selection	AT Cmd
V22b Guard Tone	Disabled	&G
Flow Control	Hardware	&K
DSR Control	DSR High	&S
Break Control	\K5	\K
Error Control Mode	V42,MNP,Buffer	\N
Data Compression	V44 V42bis MNP5	%C
DTR Dialing	Off	\$D
Eleven Bit	Off	\$EB
Parity Bit	Even	#P
AutoAnswerRing#	5	S0
AT Escape Char	43	S2
CarriageReturn Char	13	S3
Linefeed Char	10	S4
Backspace Char	8	S5

Press any key to continue; ESC to quit.

Option	Selection	AT Cmd
Blind Dial Pause	3 sec	S6
NoAnswer Timeout	65 sec	S7
", " Pause Time	2 sec	S8
Remote Config Char	37	S9
No Carrier Disc	10000 msec	S10
DTMF Dial Speed	100 msec	S11
Escape GuardTime	1000 msec	S12
Data Calling Tone	Enabled	S35
Line Rate	9600	S37
Callback Security	Disabled	#CBS
Callback Delay	15 sec	#CBD
Callback Parity	None/Space	#CBP
Callback Inactivity	20 min	#CBI
Callback Retries	4	#CBA
DID Start Protocol	Disabled	*DS
DID Digit Detection	DTMF	*DD
DID Report Format	DID:xxx	*DF
DID Number of Digits	0	*DN
DID Digit Time Out	15 sec	*DT
User Profile	Stored	&W
\$SB Setting	57600 bps	\$SB
Xon/Xoff Pacing	Pacing On	&E12/13
Leased HS Mode	PSTN HS	\$LL
RS232 Sleep	Disabled	\$SM

Press any key to continue; ESC to quit.

Stored Phone Numbers

&Z0=
&Z1=
&Z2=

0

7. If all the settings match after the power has been cycled, your modem is ready to go. If the settings do not match, try pasting in the string again.

8. If you have to set up more than one modem, press the **Disconnect** button in HyperTerminal (picture of a yellow telephone hanging up) before unplugging the serial cable. When the next modem is plugged in, press **Call** (just to the left of the Disconnect button) to connect to that modem.

Appendix A: Modem Information

The Modem String

Multitech MultiModem modems in the field

Models:

- MultiModem ZDX consumer-environment external modem, Multitech chipset
- MultiModem IND industrial-environment external modem, Multitech chipset

The current modem string is

AT&F X4EoQoVoT M1Bo So=5 S6=3 S7=65 S10=100 S30=5 S37=9

Let us break this string down into parts:

AT – Tells modem that the DTE is about to send a command or string of commands. Every string of commands must be prefaced by AT.

&F – Reset modem to factory defaults.

X4 – Report the result of a connection attempt to the DTE. Possible results are Busy (7), No Carrier (3), No Dialtone (6), and Connect <at some speed> (numeric result varies). These results are called *result codes*. The 870 needs these codes from the modem so that it can figure out how to proceed when a connection (either incoming or outgoing) is made to the noise computer.

Eo – When the DTE sends characters to the modem, do not echo these characters back to the DTE.

Qo – Enable result codes.

Vo – Display numeric result codes. The 870 requires that result codes be in the numeric (terse) format, rather than be written out as words. If the result codes are not in the numeric format:

- The 870 will not answer a call placed from the computer to the 870. The modem will answer the call after five rings, because it is programmed to do so.
- The 870 will not send a password prompt.
- The 870 will not know when its modem has gone on-hook. The 870 will be unreachable until it times out from inactivity.

T – Use tone dialing.

M1 – Turn modem speaker on. This is useful when a technician is diagnosing a communications problem at the site. It also may help keep critters away from the monitoring station.

Bo – Selects CCITT mode when modem connects at 1200 bps. This modification was made by the previous administrator of the noise monitoring system.

So=5 – Tells modem to answer a call automatically, but only after five rings. If communication between the 870 and modem is working correctly, the 870 will answer the call after one ring by sending **ATA** to the modem. If a call to the 870 is picked up after five rings:

- The 870 thinks it is still connected to the noise computer. Wait a minute or two and try calling again.
- The 870 cannot interpret the result codes coming from the modem. Make sure **Vo** is entered into the remote modem or the 870's modem init string, parameter Q158.
- There is some other communication problem between the modem and the 870.

S6=3 – Tells the modem to wait 3 seconds after it goes off-hook before it dials the noise computer. This is a tweak done by the previous administrator of the noise monitoring system.

S7=65 – When dialing, tells the modem to wait 65 seconds for a carrier signal before aborting a call. This is a tweak done by the previous administrator of the noise monitoring system.

S10=100 – Tells modem to wait 10 seconds to disconnect after losing a carrier signal. This modification was made by the previous administrator

of the noise monitoring system to prevent modems from getting stuck off-hook. This is a vital parameter.

S30=5 – If no data are sent or received for 5 minutes, the modem will disconnect and go off-hook. This works in tandem with S10=100 to keep modems from getting stuck off-hook and requiring a service call.

S37=9 – Forces modem to connect at a maximum line speed of **9600 bps**. This setting helps prevent dropped calls.

&Do – Tells modem to answer an incoming call and pass data received through the telephone line to the DTE, regardless of whether or not the DTR line is high. Probably a useful setting, given the funky cable the 870 uses to communicate with its modem.

&W – Write this string of commands to the modem's flash memory. Typing **ATZ** will load this command string into the modem's active memory.

For any AT command, entering AT <command> is the same as entering AT <command>o. So, for example **&D** is equivalent to **&Do**, and **B** is equivalent to **Bo**. This is a useful trick when trying to fit a command string into the 30 characters permitted by the 870 and the 65 characters permitted by the MultiModem.

Control RocketModems in noise computer

Models:

- Control RocketModem III internal modem, Rockwell chipset
- Conexant 56k internal modem, supplied by Dell, different Rockwell chipset

The current modem string is:

`AT&F X4 Eo Qo V1 T Mo W2 So=5 S12=0 &D2 &W`

This string must be entered into each of the modems on the RocketModem card.

V1 – Display verbose result codes. L-D Download will not recognize the numeric codes. Also, verbose codes are easier for humans to read than the numeric codes.

Mo – Turn modem speaker off, by default.

W2 – Tells modem to display the modem-to-modem connection speed upon connection.

S12=0 – When modem receives “+++”, tells modem to immediately enter command mode and respond with OK.

&D2 – When the DTR line is low, the modem will not pass received data to the computer. The modem will also go on-hook at this time.

On a side note, the string **AT+MS=V32,1,2400,9600,2400,9600** is sent to the modem before each connection attempt. This command is necessary to set the modulation type and line speed of the modem, since the Control and Conexant modems do not support the S37=9 command.

+MS – command to set modulation type and line speed

V32 – The preferred type of modulation to use. The V.32 standard works best at the 9600 bps line speed.

1 – Tells modem to automatically negotiate a modulation speed with the modem it is connecting to. Basically, do not put a zero here or you might not get a connection.

First **2400, 9600** – Lowest and highest line speeds to use when this modem is receiving a call.

Second **2400, 9600** – Lowest and highest line speeds to use when this modem is making a call.

Appendix B: LD-870/Modem Interaction

An email from a Larson-Davis engineer on the subject:

When the 870 is in the Modem Mode it expects to be in control of the modem. It uses the INIT STRING to take command and tell the modem to talk with codes (non-verbose), to not automatically answer the call for 5 rings ("S0=5" to allow the 870 to answer it within five rings with a password protocol) and a couple other commands (turn off Echo, detect dial-tone, etc). The INIT STRING can be sent to the modem vendor to verify that they support all of the commands.

When a call is received it goes through these steps (<cr> and <lf> control codes are sent at the end of commands but are not shown below for clarity):

- Modem sends "2" to 870 when a ring-in is detected
- 870 sends modem "ATA" to answer the call
- Modem connects and returns carrier connect code indicating connect speed, i.e. "12" or some other numeric code. If "3" is received it proceeds to the disconnect sequence of delay 1s, "+++", delay 1 sec, "ATH", "AT "+INIT_STRING
- 870 sends an announcement to computer through the modem such as "870A0101, 1, 0", the s/n is the unit specific serial number
- The computer sends the password to unlock the connection "870A0101, ccccccc" where the 'c' is the characters of the password
- The 870 send "Ready" back to the computer to indicate the password was received, otherwise the announcement is repeated until it count out or times out at which time it sends delay 1s, "+++", delay 1 sec, "ATH", "AT "+INIT_STRING to disconnect and re-initialize.

If the firmware no longer supports the V0 command, won't change from Auto-Answer=1 or has some other mode that connects before the 870 sends ATA then the operation described below will happen.

-Alan [Rasmussen]

Handshaking/flow control

Data are transmitted through a serial port *asynchronously*. When a device wants to send data across the serial line to another device, it just goes ahead and sends it. Sometimes the receiving device is not ready to receive the data. When this happens, the receiving device will discard the received data. A handshaking protocol is a method of letting the sending device know when the receiving device is and is not ready to receive data. This

protocol, in the context of RS-232 serial communications, is also called *flow control*.

The two types of flow control protocols for a RS-232 serial port are: hardware and software. The hardware method uses the request-to-send (RTS) and clear-to-send (CTS) status lines in the serial cable. The software method relies on sending special American Standard Code for Information Interchange (ASCII) characters to start and stop the flow of data.

The LD-870 appears to support one-way hardware flow control between itself and its modem. The 870's DTR pin is connected to the modem's CTS pin. The modem can tell the 870 to stop sending data if the modem is not ready to receive it. Hardware flow control is enabled by setting parameter Q12 on the 870 to 5 and entering AT command &K3 into the modem. Hardware flow control is implemented for all 870s and their modems as of 14 December 2006.

The 870 also supports software flow control. Software flow control can be enabled by setting parameter Q12 to 7 in the 870 and entering command &K4 into the modem. Software flow control works under ideal conditions; however, data scrambled by line noise can accidentally start or stop the flow of data at unintended times. Software flow control should be used only if there is a problem sending data to the 870. Even then, this problem is better solved by setting the modem's line and serial port speeds to 9600 bps (S37=9 on the MultiModem, S9,1 on the 870).

Dialing

The 870 dials a telephone number by issuing **ATD<number>** to the modem, where <number> is a string stored in parameter Q156. To ensure that a new modem will use tone dialing, L-D Download adds the prefix **T** to the telephone number, so that the modem now receives the command **ATDT<number>**.

Also, when using the CERL telephone system, a modem must dial 9 first to reach an outside line. A unit connected to the CERL telephone system must prefix its stored telephone number with 9 in order to call the noise computer. Likewise, the CERL download program must prefix each unit's telephone number with 9 in order to reach that unit.

Troubleshooting

One way to determine the health of an 870 is to dial it with the modem speaker turned on and count the number of rings you hear before the modem picks up. The 870 normally instructs the modem to pick up after one or two rings, as described above. If the remote modem picks up after five rings, and:

- the 870 returns “Operand-1 Range” and allows the download to proceed,

CONNECT 26400 V42bis

WARNING - Operand-1 Range ‘error from 870, received “CONNECT” instead of a number
r1 ‘no password prompt!
Larson-Davis Model 870

then the remote modem is set to use Verbose error codes. Correct this by adding **VO** to the modem’s init string or the 870’s Q158 parameter.

- no response is received from the 870,

CONNECT 26400
R1
R1
M12
+++ATH ‘escape sequence and ATH sent by program

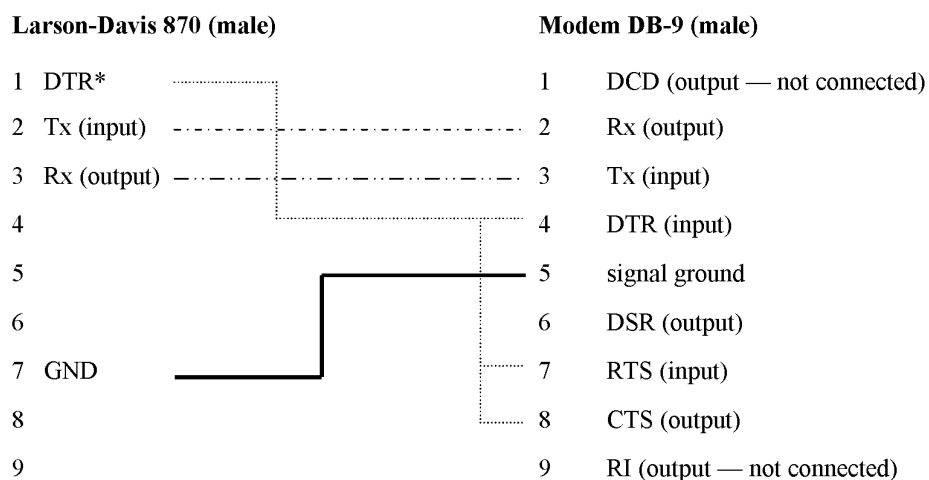
OK ‘response from local modem

then the 870 is unable to communicate with its modem. A technician will need to visit the site and, at a minimum, cycle the power on both the 870 and the modem. Blown fuses in the 870 have also caused this problem.

- L-D Download receives gibberish, likely the result of a noisy telephone line. The problem was found to be worse on windy days and when calling the units with the Control modems. Try calling the unit again with the single Conexant modem on COM4 in the noise computer and see if you still get gibberish. Also try calling again on a calm day. If the problem persists, check the telephone cabling at the site for damage. If all else fails, replace the remote modem.

When calling out, if the telephone rings for eight or nine rings, then stops, the remote modem did not receive the call. If the power is out at the site, the remote modem will not pick up.

Appendix C: Pinout of Modem-to-870 Cable



*The “DTR” label for the 870 is a misnomer; this port is an input and functions like the DSR pin would on a DTE. This is why the two DTR pins are connected together.

Appendix D: File Paths and Log File Structure

File paths

L-D Download program folder	C:\Program Files\L-D Download
Logs	C:\Program Files\L-D Download\Logs
“R variable” records	C:\Program Files\L-D Download\Setup Logs
L-D Download compile folder	My Documents\Visual Studio 2005\Projects\VB test project\VB test project\bin\Release
Database backup	D:\Complaint.bkf
Backup of My Documents	D:\my docs <date>.bkf
FTP Drop-off Folder	C:\Kristin_Ed_File_DropOff

Log file structure

After a dial sequence is completed, a text log of the communication between the computer and units is saved to a file in the Logs folder. This log is a useful tool for diagnosing communications problems between the computer and various units and was instrumental to the development of L-D Download.

Text in **blue** is used to mark where text originating from each modem or the Messages box is written.

Text in **red** is text received from a unit.

Text in black is text written to a unit, or text displayed in the Messages box.

Text in **green** displays the program’s progression through the download of a unit. It also summarizes any errors that prevented a unit from being downloaded.

All errors begin with the text “Error:”. Searching for the text `Error:` in the document will speedily take you to any errors that occurred.

Glossary

870 – A Larson-Davis model 870 noise monitor. The words 870 and unit both refer to this noise monitor.

Click – Click once with the left mouse button.

DCE – Data communications equipment. In the context of the noise monitoring system, the DCE is a modem.

Double-click – click twice in succession with the left mouse button.

Download sequence – When the user or the program's scheduler instructs the program to dial and download a group of units, the act of downloading this group of units is called a download sequence. The sequence begins when the first unit is dialed and ends when the last unit has finished downloading. During a download sequence, the Unit Options window is unavailable.

DTE – Data terminal equipment. In the context of the noise monitoring system, the DTE is either the noise computer or the 870. However, in the context of serial communications, the 870's serial port functions more like the serial port of a DCE. This is why special cables are needed to connect the 870 to a modem and to a computer.

Event – A loud burst of noise, such as a cannon blast, that is measured and recorded by the 870. An event is recorded when the **unweighted** ambient noise exceeds a specified threshold level for at least 3 seconds, then drops below the threshold level. The ambient wind speed must also be below a certain value for the noise to be interpreted as an event.

Exceedance – Same as Event. The documentation for the 870 often refers to a noise/blast event as an exceedance.

Modem – A telecommunications device used to allow a computer to exchange data with a Larson-Davis 870 noise monitor.

Off-hook – A telephone is said to be off-hook when its receiver is off of its cradle. An analog telephone would be taken off-hook just before a tele-

phone number is dialed. Similarly, a modem is off-hook when it has opened up the telephone line in order to dial another modem. When the modem is off-hook, it cannot receive telephone calls – the device trying to connect to that modem will receive a busy signal.

On-hook – A telephone is on-hook when its receiver is placed in the cradle. The telephone is not using the transmission line in this state and is able to receive calls. Similarly, a modem goes on-hook when it hangs up a call. The modem is no longer using the telephone line and is able to receive calls in this state.

Right-click – Click once with the right mouse button.

Unit – A Larson-Davis 870 noise monitor. The terms 870 and unit are used interchangeably in this document.

Unit List – A data structure used by L-D Download to store information about the 870s in the field. Each small piece of information about an 870 is stored in a variable. A variable will contain information such as the location of a particular unit or whether or not a particular unit needs to have its data reset. The variables holding information specific to one 870 are grouped together into a Unit. In the noise computer, there is one Unit for each monitoring station in the field. Finally, these 35 or so Units are collected into a single List of Units, or Unit List.

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